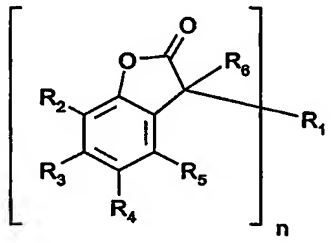
WHAT IS CLAIMED IS:

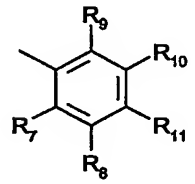
1. A composition of matter normally subject to oxidative deterioration comprising an edible organic substance normally subject to oxidative deterioration and a minor amount effective as an antioxidant of one or more compounds selected from the group consisting of (i) 3-arylbenzofuranones in the present invention are compounds of the formula I



(I)

in which, if n is 1,

R_1 is unsubstituted or C_1-C_4alkyl-, C_1-C_4alkoxy-, C_1-C_4alkylthio-, hydroxyl-, halo-, amino-, C_1-C_4alkylamino-, phenylamino- or di(C_1-C_4alkyl)amino-substituted naphthyl, phenanthryl, anthryl, 5,6,7,8-tetrahydro-2-naphthyl, 5,6,7,8-tetrahydro-1-naphthyl, thienyl, benzo[b]thienyl, naphtho[2,3-b]thienyl, thianthrenyl, dibenzofuryl, chromenyl, xanthenyl, phenoxathiinyl, pyrrolyl, imidazolyl, pyrazolyl, pyrazinyl, pyrimidinyl, pyridazinyl, indolizinyl, isoindolyl, indolyl, indazolyl, purinyl, quinolizinyl, isoquinolyl, quinolyl, phthalazinyl, naphthyridinyl, quinoxalinyl, quinazolinyl, cinnolinyl, pteridinyl, carbazolyl, β-carbolinyl, phenanthridinyl, acridinyl, perimidinyl, phenanthrolinyl, phenazinyl, isothiazolyl, phenothiazinyl, isoxazolyl, furazanyl, biphenyl, terphenyl, fluorenyl or phenoxazinyl, or R_1 is a radical of the formula II



(II)

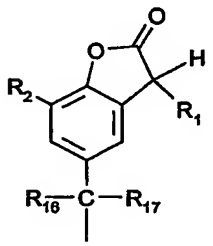
and

if n is 2,

R_1 is unsubstituted or C_1-C_4alkyl- or hydroxy-substituted phenylene or naphthylene; or is $-R_{12}-X-R_{13}-$,

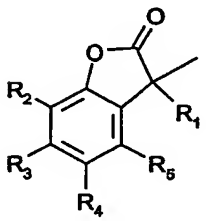
R_2, R_3, R_4 and R_5 independently of one another are hydrogen, chlorine, hydroxyl, C_1-C_{25}alkyl, C_7-C_9phenylalkyl, unsubstituted or C_1-C_4alkyl-substituted phenyl; unsubstituted or C_1-C_4alkyl-substituted C_5-C_8cycloalkyl; C_1-C_{18}alkoxy, C_1-C_{18}alkylthio, C_1-C_4alkylamino, di(C_1-

C_4alkyl)amino, C_1-C_{25}alkanoyloxy, C_1-C_{25}alkanoylamino, C_3-C_{25}alkenoyloxy, C_3-C_{25}alkanoyloxy which is interrupted by oxygen, sulfur or $>N-R_{14}$; C_6-C_9cycloalkylcarbonyloxy, benzoyloxy or C_1-C_{12}alkyl-substituted benzoyloxy; or else the radicals R_2 and R_3 or the radicals R_3 and R_4 or the radicals R_4 and R_5, together with the carbon atoms to which they are attached, form a benzo ring, R_4 is additionally $-(CH_2)_p-COR_{15}$ or $-(CH_2)_qOH$ or, if R_3, R_5 and R_6 are hydrogen, R_4 is additionally a radical of the formula III



(III)

in which R_1 is defined as indicated above for n = 1,
R_6 is hydrogen or a radical of the formula IV



(IV)

where R_4 is not a radical of the formula III and R_1 is defined as indicated above for n = 1,
R_7, R_8, R_9, R_{10} and R_{11} independently of one another are hydrogen, halogen, hydroxyl, C_1-C_{25}alkyl, C_2-C_{25}alkyl interrupted by oxygen, sulfur or $>N-R_{14}$; C_1-C_{25}alkoxy, C_2-C_{25}alkoxy interrupted by oxygen, sulfur or $>N-R_{14}$; C_1-C_{25}alkylthio, C_3-C_{25}alkenyl, C_3-C_{25}alkenyloxy, C_3-C_{25}alkynyl, C_3-C_{25}alkynyloxy, C_7-C_9phenylalkyl, C_7-C_9phenylalkoxy, unsubstituted or C_1-C_4alkyl-substituted phenyl; unsubstituted or C_1-C_4alkyl-substituted phenoxy; unsubstituted or C_1-C_4alkyl-substituted C_5-C_8cycloalkyl; unsubstituted or C_1-C_4alkyl-substituted C_5-C_8cycloalkoxy; C_1-C_4alkylamino, di(C_1-C_4alkyl)amino, C_1-C_{25}alkanoyl, C_3-

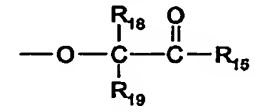
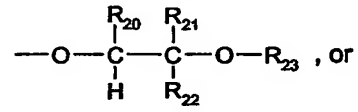
C_{25}alkanoyl interrupted by oxygen, sulfur or  ; C_1-C_{25}alkanoyloxy, C_3-

C_{25}alkanoyloxy interrupted by oxygen, sulfur or  ; C_1-C_{25}alkanoylamino, C_3-

C_{25}alkenoyl, C_3-C_{25}alkenoyl interrupted by oxygen, sulfur or  ; C_3-C_{25}alkenoyloxy,

C_3-C_{25}alkenoyloxy interrupted by oxygen, sulfur or  ; C_6-C_9cycloalkylcarbonyl, C_6-

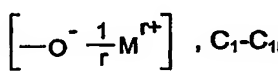
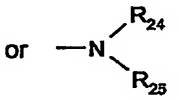
C_9cycloalkylcarbonyloxy, benzoyl or C_1-C_{12}alkyl-substituted benzoyl; benzoyloxy or C_1-

C_{12}alkyl-substituted benzoyloxy;  or  , or

else, in formula II, the radicals R_7 and R_8 or the radicals R_8 and R_{11}, together with the carbon atoms to which they are attached, form a benzo ring,

R_{12} and R_{13} independently of one another are unsubstituted or C_1-C_4alkyl-substituted phenylene or naphthylene,

R_{14} is hydrogen or C_1-C_8alkyl,

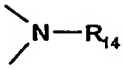
R_{15} is hydroxyl,  , C_1-C_{18}alkoxy or  ,

R_{16} and R_{17} independently of one another are hydrogen, CF_3, C_1-C_{12}alkyl or phenyl, or R_{16} and R_{17}, together with the C atom to which they are attached, form a C_5-C_8cycloalkylidene ring which is unsubstituted or substituted from 1 to 3 times by C_1-C_4alkyl;

R_{18} and R_{19} independently of one another are hydrogen, C_1-C_4alkyl or phenyl,

R_{20} is hydrogen or C_1-C_4alkyl,

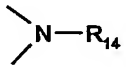
R_{21} is hydrogen, unsubstituted or C_1-C_4alkyl-substituted phenyl; C_1-C_{25}alkyl, C_2-C_{25}alkyl interrupted by oxygen, sulfur or  ; C_7-C_9phenylalkyl which is unsubstituted or substituted on the phenyl radical from 1 to 3 times by C_1-C_4alkyl; C_7-C_{25}phenylalkyl which is unsubstituted or substituted on the phenyl radical from 1 to 3 times by C_1-C_4alkyl and

interrupted by oxygen, sulfur or  , or else the radicals R_{20} and R_{21}, together with

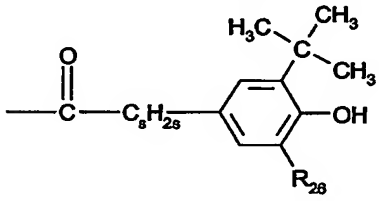
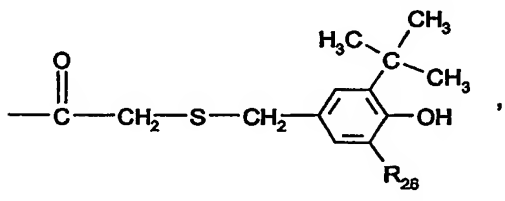
the carbon atoms to which they are attached, form a C_5-C_{12}cycloalkylene ring which is unsubstituted or substituted from 1 to 3 times by C_1-C_4alkyl;

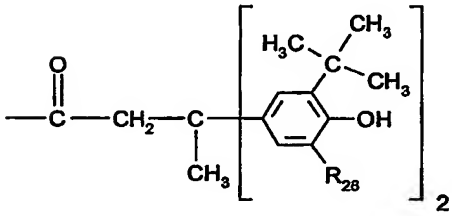
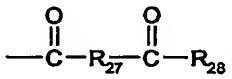
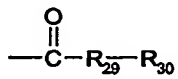
R_{22} is hydrogen or C_1-C_4alkyl,

R_{23} is hydrogen, C_1-C_{25}alkanoyl, C_3-C_{25}alkenoyl, C_3-C_{25}alkanoyl interrupted by oxygen, sulfur

or  ; C_2-C_{25}alkanoyl substituted by a di(C_1-C_8alkyl)phosphonate group;

C_6-C_9cycloalkylcarbonyl, thenoyl, furoyl, benzoyl or C_1-C_{12}alkyl-substituted benzoyl;

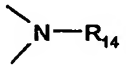
 ,  ,

 ,  or  ,

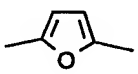
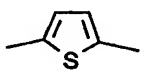
R_{24} and R_{25} independently of one another are hydrogen or C_1-C_{18}alkyl,

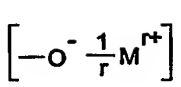
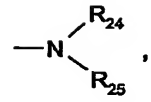
R_{26} is hydrogen or C_1-C_8alkyl,

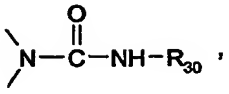
R_{27} is a direct bond, C_1-C_{18}alkylene, C_2-C_{18}alkylene interrupted by oxygen, sulfur or

 ; C_2-C_{18}alkenylene, C_2-C_{20}alkylidene, C_7-C_{20}phenylalkylidene,

C_5-C_8cycloalkylene, C_7-C_8bicycloalkylene, unsubstituted or C_1-C_4alkyl-substituted phenylene,

or  or  ,

R_{28} is hydroxyl,  , C_1-C_{18}alkoxy or  ,

R_{29} is oxygen, -NH- or  ,

R_{30} is C_1-C_{18}alkyl or phenyl,

R_{31} is hydrogen or C_1-C_{18}alkyl,

M is an r-valent metal cation,

X is a direct bond, oxygen, sulfur or -NR_{31}-,

n is 1 or 2,

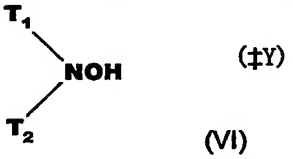
p is 0, 1 or 2,

q is 1, 2, 3, 4, 5 or 6,

r is 1, 2 or 3, and

s is 0, 1 or 2;

(ii) a long chain N,N-dialkylhydroxylamine of formula (VI)

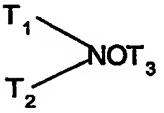


(‡Y)

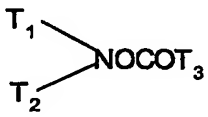
(VI)

wherein $T_1$and T_2 are independently straight or branched chain alkyl of 6 to 36 carbon atoms;

(iii) substituted hydroxylamines may be for example of the formula (VIII) or (IX)



(VIII)



(IX)

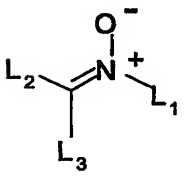
wherein

T_1 is straight or branched chain alkyl of 1 to 36 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, aralkyl of 7 to 9 carbon atoms, or said aralkyl substituted by one or two alkyl of 1 to 12 carbon atoms or by one or two halogen atoms;

T_2 is hydrogen, or independently has the same meaning as T_1; and

T_3 is allyl, straight or branched chain alkyl of 1 to 36 carbon atoms, cycloalkyl of 5 to 18 carbon atoms, cycloalkenyl of 5 to 18 carbon atoms or a straight or branched chain alkyl of 1 to 4 carbon atoms substituted by phenyl or by phenyl substituted by one or two alkyl groups of 1 to 4 carbon atoms or by 1 or 2 halogen atoms;

(iv) nitrones of the formula (X)



(X)

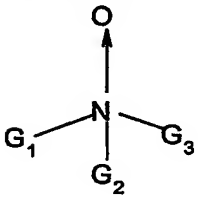
wherein

L_1 is straight or branched chain alkyl of 1 to 36 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, aralkyl of 7 to 9 carbon atoms, or said aralkyl substituted by one or two alkyl of 1 to 12 carbon atoms or by one or two halogen atoms;

L_2 and L_3 are independently hydrogen, straight or branched chain alkyl of 1 to 36 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, aralkyl of 7 to 9 carbon atoms, or said aralkyl substituted by one or two alkyl of 1 to 12 carbon atoms or by one or two halogen atoms;

or L_1 and L_2 together form a five- or six-membered ring including the nitrogen atom; and

(v) amine oxides are for example saturated tertiary amine oxides as represented by general formula (XI):



(XI)

wherein

G_1 and G_2 are independently a straight or branched chain alkyl of 6 to 36 carbon atoms, aryl of 6 to 12 carbon atoms, aralkyl of 7 to 36 carbon atoms, alkaryl of 7 to 36 carbon atoms, cycloalkyl of 5 to 36 carbon atoms, alkcycloalkyl of 6 to 36 carbon atoms or cycloalkylalkyl of 6 to 36 carbon atoms;

G_3 is a straight or branched chain alkyl of 1 to 36 carbon atoms, aryl of 6 to 12 carbon atoms, aralkyl of 7 to 36 carbon atoms, alkaryl of 7 to 36 carbon atoms, cycloalkyl of 5 to 36 carbon atoms, alkcycloalkyl of 6 to 36 carbon atoms or cycloalkylalkyl of 6 to 36 carbon atoms; with the proviso that at least one of G_1,G_2 and G_3 contains a b carbon-hydrogen bond; and

wherein said aryl groups may be substituted by one to three halogen, alkyl of 1 to 8 carbon atoms, alkoxy of 1 to 8 carbon atoms or combinations thereof; and

wherein said alkyl, aralkyl, alkaryl, cycloalkyl, alkcycloalkyl and cycloalkylalkyl groups may be interrupted by one to sixteen -O-, -S-, -SO-, -SO_2-, -COO-, -OCO-, -CO-, -NG_4-, -$CONG_4$- and -NG_4CO- groups, or wherein said alkyl, aralkyl, alkaryl, cycloalkyl, alkcycloalkyl and cycloalkylalkyl groups may be substituted by one to sixteen groups selected from -OG_4, -SG_4, -$COOG_4$, -$OCOG_4$, -COG_4, -$N(G_4)_2$, -$CON(G_4)_2$, -NG_4COG_4 and 5- and 6-membered rings containing the -$C(CH_3)(CH_2R_x)NL(CH_2R_x)(CH_3)C$- group or wherein said alkyl, aralkyl, alkaryl, cycloalkyl, alkcycloalkyl and cycloalkylalkyl groups are both interrupted and substituted by the groups mentioned above; and

wherein

G_4 is independently hydrogen or alkyl of 1 to 8 carbon atoms;

R_x is hydrogen or methyl;

L is hydrogen, hydroxy, C_{1-30} straight or branched chain alkyl moiety, a -C(O)R moiety where R is a C_{1-30} straight or branched chain alkyl group, or a -OR_y moiety; and

R_y is C_{1-30} straight or branched chain alkyl, C_2-C_{30} alkenyl, C_2-C_{30} alkynyl, C_5-C_{12} cycloalkyl, C_6-C_{10} bicycloalkyl, C_5-C_8 cycloalkenyl, C_6-C_{10} aryl, C_7-C_9 aralkyl, C_7-C_9 aralkyl substituted by alkyl or aryl, or -CO(D), where D is C_1-C_{18} alkyl, C_1-C_{18} alkoxy, phenyl, phenyl substituted by hydroxy, alkyl or alkoxy, or amino or amino mono- or di-substituted by alkyl or phenyl.

2. The composition of claim 1 wherein the benzofuranone is at least one compound of formula I wherein n = 1, R_1 is phenyl which is unsubstituted or substituted in para-position by C_1-C_{18}alkylthio or di(C_1-C_4alkyl)amino; mono- to penta-substituted alkyphenyl containing together a total of at most 18 carbon atoms in the 1 to 5 alkyl substituents; naphthyl, biphenyl, terphenyl, phenanthryl, anthryl, fluorenyl, carbazolyl, thienyl, pyrrolyl, phenothizinyl or 5,6,7,8-tetrahydronaphthyl, each of which is unsubstituted or substituted by C_1-C_4alkyl, C_1-C_4alkoxy, C_1-C_4alkylthio, hydroxy or amino.

3. The composition of claim 1 wherein the benzofuranone is a compound of formula I wherein n is 2, R_1 is $-R_{12}-X-R_{13}-$, R_{12} and R_{13} are phenylene, X is oxygen or $-NR_{31}-$, and R_{31} is C_1-C_4alkyl.

4. The composition of claim 1 wherein the benzofuranone is at least one compound selected from the group consisting of 3-[4-(2-acetoxyethoxy)phenyl]-5,7-di-tert-butyl-benzofuran-2-one; 5,7-di-tert-butyl-3-[4-(2-stearoyloxyethoxy)phenyl]benzofuran-2-one; 3,3'-bis[5,7-di-tert-butyl-3-(4-[2-hydroxyethoxy]phenyl)benzofuran-2-one]; 5,7-di-tert-butyl-3-(4-ethoxyphenyl)benzofuran-2-one; 3-(4-acetoxy-3,5-dimethylphenyl)-5,7-di-tert-butylbenzofuran-2-one; 3-(3,5-dimethyl-4-pivaloyloxy-phenyl)-5,7-di-tert-butyl-benzofuran-2-one; 5,7-di-tert-butyl-3-phenylbenzofuran-2-one; 5,7-di-tert-butyl-3-(3,4-dimethylphenyl)-benzofuran-2-one; 5,7-di-tert-butyl-3-(2,3-dimethylphenyl)benzofuran-2-one.

5. The compositions of claim 1 wherein the long chain hydroxylamine is a compound of the formula (VI) wherein T_1 and T_2 are independently selected from a straight or branched chain alkyl of 12-36 carbon atoms.

6. The composition of claim 1 wherein the long chain hydroxylamine is a compound of the formula (VI) wherein T_1 and T_2 are independently selected from a straight or branched chain alkyl of 16-18 carbon atoms.

7. The composition of claim 1 wherein the long chain hydroxylamine is a compound of formula (VI) wherein T_1 and T_2 are the same and are a straight chain alkyl of 18 carbon atoms.

8. The composition of claim 1 wherein the substituted hydroxylamine is at least one comopound selected from O-allyl-N,N-dioctadecylhydroxylamine and O-n-propyl-N,N-dioctadecylhydroxylamine or N,N-di(hydrogenated tallow)acetoxyamine.

9. The composition of claim 1 wherein the nitrone is at least one compound selected from the group consisting of N-benzyl-α-phenylnitrone, N-ethyl-α-methylnitrone, N-octyl-α-heptylnitrone, N-lauryl-α-undecylnitrone, N-tetradecyl-α-tridcylnitrone, N-hexadecyl-α-pentadecylnitrone, N-octadecyl-α-heptadecylnitrone, N-hexadecyl-α-heptadecylnitrone, N-ocatadecyl-α-pentadecylnitrone, N-heptadecyl-α-heptadecylnitrone, N-octadecyl-α-

hexadecylnitrone, N-methyl-α-heptadecylnitrone and the nitrone derived from N,N-di(hydrogenated tallow)hydroxylamine.

10. The composition of claim 1 wherein the amine oxide is a trialkyl amine oxide.

11. The composition of claim 1 wherein the amine oxide is tri(C_{12}-C_{14}) amine oxide.

12. The composition of claim 1 wherein the amine oxide is di(C_{12}-C_{14}) methyl amine oxide.

13. The composition of claim 1 wherein the amine oxide is tri(C_{16}-C_{18}) amine oxide.

14. The composition of claim 1 wherein the antioxidant is present in an amount of from about 0.005% by weight to about 5% by weight, based on the weight of the edible organic substance.

15. The composition of claim 1 wherein the antioxidant is present in an amount of from about 0.01% by weight to about 1% by weight, based on the weight of the edible organic substance.

16. The composition of claim 1 wherein the composition further comprises additional food additives selected from food antioxidants in addition to those specified in claim 1, emulsifiers, suspension agent and colorings.

17. The composition of claim 1 wherein the composition further comprises food antioxidants selected from the group consisting of butylated hydroxytoluene, butylated hydroxyanisole, tocopherol, ascorbic acid, benzylphosphonates, esters of b-(3,5-di-tert-butyl-4-hydroxyphenyl)propionic acid with mono- or polyhydric alcohols, esters of b-(5-tert-butyl-4-hydroxy-3-methylphenyl)propionic acid with mono- or polyhydric alcohols, esters of b-(3,5-dicyclohexyl-4-hydroxyphenyl)propionic acid with mono- or polyhydric alcohols, esters of 3,5-di-tert-butyl-4-hydroxyphenyl acetic acid with mono- or polyhydric alcohols, phosphites and phosphonites.

18. The composition of claim 1 wherein the antioxidant is one or more compounds selected from the group consisting of

i.) an N,N-di(alkyl)hydroxylamine produced by the direct oxidation of N,N-di(hydrogenated tallow)amine,

ii.) O-allyl-N,N-dioctadecylhydroxylamine,

iii.) N-octadecyl-a-heptadecylnitrone, and

iv.) a di(C_{16}-C_{18})alkyl methyl amine oxide.

19. The composition of claim 1 wherein the edible organic substance is a food containing fatty acid glycerides, edible fats and fatty oils.

20. The composition of claim 1 wherein the edible organic substance is a pet food or animal feed.